MedicalXpress

Toward more targeted cancer vaccines

February 17 2015

Scientists from Cardiff have used powerful X-ray technology to visualise how white blood cells interact with skin cancer cells, paving the way for the development of more accurate cancer vaccines.

Targeting cancer using T-Cells, a kind of white blood cell, has been the focus of many investigations. T-Cells have highly sensitive fingertips called antigen receptors (TCRs) which are used to probe the body for signs of disease. If the TCR latches on to a diseased cell, it can signal the T-Cell to eliminate the threat.

However, T-Cells are programmed not to attack our own tissue, a major obstacle for scientists trying to target cancer cells which are often born out of healthy cells. To get around this, a number of labs have tried modifying a fragment of the cancer cell as a vaccine to stimulate cancer specific T-Cells. But success in using this approach has to date been frustrated by a limited knowledge of how T-Cells interact with cancer cells.

To overcome this, researchers from Cardiff's School of Medicine collaborated with Diamond Light Source, the national synchrotron facility, to generate beams of electromagnetic radiation – a thousand times brighter than the sun - to visualise for the first time how T-Cell receptors can distinguish between a modified cancer fragment used in vaccines, and natural cancer cells.

In a paper published today in the *European Journal of Immunology*, the researchers describe how T-cell receptors are able to latch on to natural

skin cancer markers, subtly changing their shape, though this interaction did not occur with the vaccine. This, they say, explains why vaccines have to date been unsuccessful in attracting T-cell receptors to eliminate diseased cells.

"Visualising receptor molecules is vital to understanding how they work," said lead researcher Dr David Cole from Cardiff's School of Medicine. "Although our results are really important for understanding how T-cells see skin cancer, they also tell us something new about the flexible nature of the T-cell antigen receptor and its exquisite accuracy. We hope that understanding these mechanisms will also have far reaching implications for diseases other than cancer."

Professor Andy Sewell, also from the School of Medicine, said: "I've always believed that seeing is believing. Now we have an atomic resolution picture, we know what happens at the molecular level and we have a better chance at developing more targeted vaccines in the future."

Dr Ian Lewis, Director of Research for Tenovus Cancer Care said: "This research is incredibly exciting as it provides an important step towards us harnessing the power and specificity of our own immune systems to destroy cancer cells.

"Cancer vaccines and other therapies that utilise the immune system have to potential to provide extremely effective treatment for a wide range of cancers with little side effects. Therefore we are delighted to have helped support this research which could help make this a reality for all cancer patients."

Provided by Cardiff University